

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-059896

(43)Date of publication of application : 25.02.2000

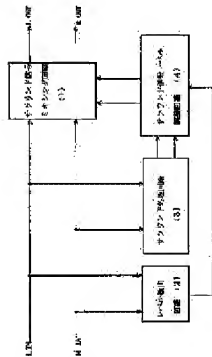
(51)Int.Cl.

H04S 7/00

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(22)Date of filing : 06.08.1998 (72)Inventor : GOTO HIROSHI

## (54) SURROUND ADJUSTMENT DEVICE



### (57)Abstract:

PROBLEM TO BE SOLVED: To prevent the S/N from being deteriorated causing unpleasant noise because a surround signal is not almost produced in a non-signal or a very small signal and only the noises are included in an acoustic device having a surround function.

SOLUTION: Received L, R signals are respectively given to a level detection circuit 2, a surround processing circuit 3, and a surround signal mixing circuit 1. The surround processing circuit 3 generates a surround signal such as a reverberation sound and a reflected sound artificially from the L, R signals and a surround signal level adjustment circuit gives a surround signal whose level is adjusted to the surround signal mixing circuit 1. The surround signal mixing circuit 1 puts together the surround signal from the L, R signal and outputs the result. The level detection circuit 2 controls the surround signal level adjustment circuit 4 and when the level of the L, R signals is small, the output of the surround signal level adjustment circuit 4 is

decreased and when the level of the L, R signals is high, the output of the surround signal level adjustment circuit 4 is increased.

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#### LEGAL STATUS

[Date of request for examination] 28.11.2000

[Date of sending the examiner's decision of rejection] 28.09.2004

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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#### CLAIMS

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[Claim(s)]

[Claim 1] The surround effectiveness adjusting device characterized by to have the surround processing circuit which generates a reverberation sound and a reflected sound from L of a stereo signal, and R signal, the mixing circuit which mixes the reverberation sound generated in said surround processing circuit, and a reflected sound to the signal of L and R, the surround signal-level equalization circuit which adjusts the

amount of mixing in said mixing circuit, and the level detector which detects the level of L and R signal.

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#### DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[Field of the Invention] This invention relates to the audio equipment which contained the surround circuit.

[Description of the Prior Art] Conventionally, there is JP, 6-153296, A as an audio equipment which contained the surround circuit. The source means for switching which this inputs the sound signal of two or more sources, and chooses the signal of the specific source, The differential amplifying circuit which generates the differential signal of the sound signal of the right-and-left channel outputted from said source means for switching, The phase delay circuit delayed in the phase of a quantity region frequency component among the differential signals which said differential amplifying circuit outputs, The adder circuit which while outputs as for said source means for switching, and adds the signal of a channel, and the output of said phase delay circuit, The subtractor circuit which subtracts the output of said phase delay circuit from the signal of the channel of another side which said source means for switching outputs, In a sound system including the surround circuit possessing the 1st voice output means which amplifies the output of said adder circuit and outputs voice, and the 2nd voice output means which amplifies the output of said subtractor circuit and outputs voice the time of the sound signal of the source below a specific S/N value being chosen based on the change-over control signal which said source means for switching outputs -- said difference -- the surround signal attenuation circuit to which the attenuation factor of the differential

signal of an amplifying circuit is made to increase is prepared.

[Problem(s) to be Solved by the Invention] In order to acquire the surround effectiveness in an audio playback unit generally, a reverberation sound and a reflected sound are generated more nearly artificially [ in a surround processing circuit ] than L of a stereo, and R signal, and it is compounded to L and R signal. Therefore, since a reverberation sound or not only a reflected sound but the own noise of a surround processing circuit is compounded by L and R signal at the time of surround playback, S/N worsens as compared with the time of surround-off. Since only a noise is especially compounded at the time of a non-signal or a minute signal, without hardly generating a surround signal, aggravation of S/N becomes remarkable. It set to the above-mentioned conventional audio equipment, and was not taken into consideration at all about the problem of aggravation of S/N at the time of such a non-signal or a very small signal.

[Means for Solving the Problem] The surround processing circuit which generates a reverberation sound and a reflected sound from L of a stereo signal, and R signal in this invention in order to solve the above-mentioned technical problem, The mixing circuit which mixes the reverberation sound generated in said surround processing circuit, and a reflected sound to the signal of L and R, Let the surround effectiveness adjusting device equipped with the surround signal level equalization circuit which adjusts the amount of mixing in said mixing circuit, and the level detector which detects the level of L and R signal be an offer plug.

[Embodiment of the Invention] Hereafter, 1 operation gestalt of this invention is explained, referring to a drawing. Drawing 1 is the circuit block diagram showing the configuration of the surround effectiveness adjusting device of this invention. L and R signal which were inputted are inputted into the level detector 2, the surround processing circuit 3, and the surround signal mixing circuit 1, respectively. In the surround processing circuit 3, the surround signal of a reverberation sound or a reflected sound is generated more nearly artificially than L and R signal, and the surround signal which adjusted level in the surround signal level equalization circuit 4 is inputted into the surround signal mixing circuit 1. The surround signal mixing circuit 1 compounds and outputs a surround signal to L and R signal. Control of the surround signal level equalization circuit 4 is performed in the level detector 2, when the level of L and R signal is small, the output of the surround signal level equalization circuit 4 is made small, and when the level of L and R signal is large, the output of the surround

signal level equalization circuit 4 is enlarged. Therefore, since the noise level generated from the surround processing circuit 3 is also small and it can carry out when small or there is no level of L and R signal, on the whole, S/N is improvable.

[Effect of the Invention] As mentioned above, the surround processing circuit which will generate a reverberation sound and a reflected sound from L of a stereo signal, and R signal if it depends on this invention as explained in full detail, The mixing circuit which mixes the reverberation sound generated in said surround processing circuit, and a reflected sound to the signal of L and R, Since it had the surround signal level equalization circuit which adjusts the amount of mixing in said mixing circuit, and the level detector which detects the level of L and R signal Since the amount of mixing of a surround signal can carry out adjustable according to the level of L and R signal, Although S/N worsens and a noise becomes jarring in the conventional circuit so that the level of L and R signal is small, since the noise level generated from a surround processing circuit is fixed regardless of the amount of generation of a surround signal In this invention, or there is no level of L and R signal, when a surround signal when small is hardly generated, by stopping a surround processing circuit output level, a noise level can be lowered and the whole S/N can be improved.

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#### DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The circuit block diagram showing the configuration of the surround adjusting device of this invention.

[Description of Notations]

1 Surround Signal Mixing Circuit

- 2 Level Detector
- 3 Surround Processing Circuit
- 4 Surround Signal Level Equalization Circuit

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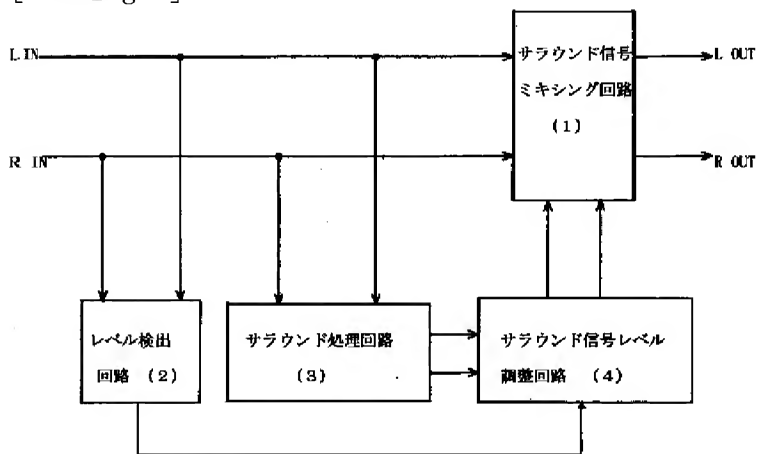
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## DRAWINGS

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[Drawing 1]



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[Translation done.]

(19)日本国特許庁 (J P)

(12) 公 開 特 許 公 報 (A)

(11)特許出願公開番号  
特開2000-59896  
(P2000-59896A)

(43)公開日 平成12年2月25日(2000.2.25)

(51)Int.Cl.<sup>7</sup>

H 0 4 S 7/00

識別記号

F I

H 0 4 S 7/00

テーマコード\*(参考)

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審査請求 未請求 請求項の数 1 O L (全 3 頁)

(21)出願番号 特願平10-223452

(22)出願日 平成10年8月6日(1998.8.6)

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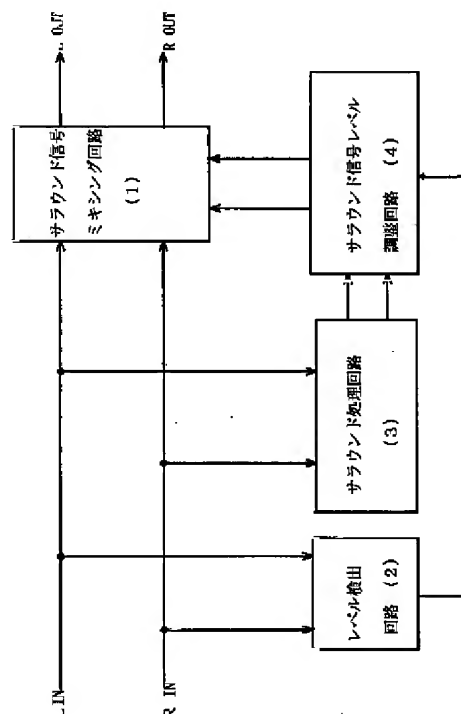
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(54)【発明の名称】 サラウンド調整装置

(57)【要約】

【課題】 サラウンド機能を有する音響機器において、無信号時または微小信号時にはサラウンド信号がほとんど生成されずにノイズのみ合成されるためS/Nが悪化してノイズが耳障りとなるのを防止する。

【解決手段】 入力されたL、R信号は、レベル検出回路2、サラウンド処理回路3、サラウンド信号ミキシング回路1にそれぞれ入力される。サラウンド処理回路3ではL、R信号より人工的に残響音や反射音のサラウンド信号を生成し、サラウンド信号レベル調整回路4でレベルを調整したサラウンド信号をサラウンド信号ミキシング回路1に入力する。サラウンド信号ミキシング回路1は、L、R信号にサラウンド信号を合成して出力する。サラウンド信号レベル調整回路4のコントロールはレベル検出回路2で行い、L、R信号のレベルが小さい時はサラウンド信号レベル調整回路4の出力を小さくし、L、R信号のレベルが大きい時はサラウンド信号レベル調整回路4の出力を大きくする。



## 【特許請求の範囲】

【請求項1】 ステレオ信号のL、R信号より残響音、反射音を生成するサラウンド処理回路と、前記サラウンド処理回路で生成された残響音、反射音をL、Rの信号にミキシングするミキシング回路と、前記ミキシング回路におけるミキシング量を調整するサラウンド信号レベル調整回路と、L、R信号のレベルを検出するレベル検出回路とを備えたことを特徴とするサラウンド効果調整装置。

## 【発明の詳細な説明】

【発明の属する技術分野】本発明は、サラウンド回路を内蔵した音響機器に関する。

【従来の技術】従来、サラウンド回路を内蔵した音響機器として、例えば特開平6-153296号がある。これは、複数ソースの音声信号を入力し、特定ソースの信号を選択するソース切手段と、前記ソース切手段から出力される左右チャンネルの音声信号の差分信号を生成する差動増幅回路と、前記差動増幅回路の出力する差分信号のうち高域周波数成分の位相を遅延する位相遅延回路と、前記ソース切手段の出力する一方のチャンネルの信号と前記位相遅延回路の出力を加算する加算回路と、前記ソース切手段の出力する他方のチャンネルの信号から前記位相遅延回路の出力を減算する減算回路と、前記加算回路の出力を増幅し、音声出力する第1の音声出力手段と、前記減算回路の出力を増幅し、音声出力する第2の音声出力手段と、を具備するサラウンド回路を含む音響再生装置において、前記ソース切手段の出力する切制御信号に基づいて特定のS/N値以下のソースの音声信号が選択されたときに前記差分増幅回路の差分信号の減衰率を増加させるサラウンド信号減衰回路を設けたものである。

【発明が解決しようとする課題】一般にオーディオ再生装置においてサラウンド効果を得るためには、ステレオのL、R信号よりサラウンド処理回路で人工的に残響音や反射音を生成し、それをL、R信号に合成している。従ってサラウンド再生時には残響音や反射音だけでなく、サラウンド処理回路自身のノイズもL、R信号に合成されるため、サラウンドオフ時に比較してS/Nが悪くなる。特に、無信号時または微小信号時にはサラウンド信号がほとんど生成されずにノイズのみ合成されるためS/Nの悪化が顕著になる。上記従来の音響機器においては、このような無信号時または微小信号時におけるS/Nの悪化の問題については何ら考慮されていなかった。

【課題を解決するための手段】上記の課題を解決するため本発明では、ステレオ信号のL、R信号より残響音、反射音を生成するサラウンド処理回路と、前記サラウンド処理回路で生成された残響音、反射音をL、Rの信号にミキシングするミキシング回路と、前記ミキシング回

路におけるミキシング量を調整するサラウンド信号レベル調整回路と、L、R信号のレベルを検出するレベル検出回路とを備えたサラウンド効果調整装置を提供せんとするものである。

【発明の実施の形態】以下、図面を参照しつつ本発明の一実施形態について説明する。図1は本発明のサラウンド効果調整装置の構成を示す回路ブロック図である。入力されたL、R信号は、レベル検出回路2、サラウンド処理回路3、サラウンド信号ミキシング回路1にそれぞれ入力される。サラウンド処理回路3ではL、R信号より人工的に残響音や反射音のサラウンド信号を生成し、サラウンド信号レベル調整回路4でレベルを調整したサラウンド信号をサラウンド信号ミキシング回路1に入力する。サラウンド信号ミキシング回路1は、L、R信号にサラウンド信号を合成して出力する。サラウンド信号レベル調整回路4のコントロールはレベル検出回路2で行い、L、R信号のレベルが小さい時はサラウンド信号レベル調整回路4の出力を小さくし、L、R信号のレベルが大きい時はサラウンド信号レベル調整回路4の出力を大きくする。従って、L、R信号のレベルが無いまたは小さい時はサラウンド処理回路3より発生するノイズレベルも小さくすることができるため全体的にS/Nを改善することができる。

【発明の効果】以上、詳述した如く本発明に依れば、ステレオ信号のL、R信号より残響音、反射音を生成するサラウンド処理回路と、前記サラウンド処理回路で生成された残響音、反射音をL、Rの信号にミキシングするミキシング回路と、前記ミキシング回路におけるミキシング量を調整するサラウンド信号レベル調整回路と、L、R信号のレベルを検出するレベル検出回路とを備えたので、サラウンド信号のミキシング量は、L、R信号のレベルに応じて可変できるため、従来の回路ではサラウンド処理回路より発生するノイズレベルはサラウンド信号の生成量に関係なく一定しているのでL、R信号のレベルが小さいほどS/Nが悪くなりノイズが耳障りとなるが、本発明ではL、R信号のレベルが無いまたは小さい時のサラウンド信号がほとんど生成されないときはサラウンド処理回路出力レベルを抑えることによりノイズレベルを下げ、全体のS/Nを改善することが出来る。

## 【図面の簡単な説明】

【図1】本発明のサラウンド調整装置の構成を示す回路ブロック図。

## 【符号の説明】

- 1 サラウンド信号ミキシング回路
- 2 レベル検出回路
- 3 サラウンド処理回路
- 4 サラウンド信号レベル調整回路



【図1】

